

AMENDMENT UNDER 37 C.F.R. § 1.111
Application No.: 10/049,188
Atty Docket No.: Q63028

REMARKS

The Office Action of March 17, 2004 has been received and its contents carefully considered.

Claims 1 to 30 are all the claims pending in the application, prior to the present amendment.

The Examiner has acknowledged applicants' claim for foreign priority based on the two Japanese priority applications, but states that applicants have not filed a certified copy of the Japanese priority applications.

The present application is a National Stage Entry of an International Application. Applicants assume the International Authority has or will provide copies to the Examiner. Applicants request the Examiner to inquire with the PCT branch of the U.S. Patent & Trademark Office for the certified copies. Applicants have filed the certified copies with the International Authority.

The Examiner states that applicants claim benefit to Provisional Application No. 60/267,412 filed in a language other than English. The Examiner states that an English translation of this Provisional Application has not been filed.

In response, applicants point out that they filed, in the present application, a translation of the Provisional Application on June 10, 2002, and have a stamped filing receipt acknowledging receipt by the Patent Office of the translation. Applicants enclose herewith a copy of the stamped filing receipt. Applicants will submit another copy of the translation if it is missing from the Examiner's file.

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The Examiner further states that the present application claims benefit of Provisional Application No. 60/308,855 filed in a language other than English, and that applicants have not filed an English translation of this Provisional Application.

In response, applicants point out a translation of Provisional Application No. 60/308,855 was filed directly in the Provisional Application on June 10, 2002. Applicants enclose a copy of a stamped filing receipt dated June 10, 2002 acknowledging this filing.

Claims 21-27, 29 and 30 have been objected to as being improper multiple dependent claims.

In response, applicants have amended claims 21 and 22 to place them in independent form, have cancelled claim 25, and have amended claims 24, 26 and 27 as set forth above, so that the claims no longer contain improper multiple dependencies. Applicants note that they have also amended the withdrawn claims to remove improper multiple dependencies.

Claim 1 has been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner states that the phrase “or an assembly used thereof” is not defined, and it is not clear what this phrase relates to.

Applicants submit that one of ordinary skill in the art would readily understand the meaning of the objected to phrase. In particular, the objected to phrase is directed to an assembly for a fuel cell. Applicants do not understand why the Examiner believes the phrase is unclear.

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In any event, applicants have amended claim 1 to change the objected to phrase to “or an assembly for a fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer”.

In view of the above, applicants submit that claim 1 complies with the requirements of the second paragraph of 35 U.S.C. § 112 and, accordingly, request withdrawal of this rejection.

Claims 1, 17 and 19 have been rejected under 35 U.S.C. § 102(b) as anticipated by JP 60-074354.

Applicants submit that JP '354 does not disclose or suggest the subject matter of claims 1.17 and 19 as amended above and, accordingly, request withdrawal of this rejection.

The present invention, as set forth in claim 1 as amended above, is directed to a fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer, or an assembly for a fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer, characterized in that (i) the catalyst layer comprises catalyst-bearing conductive powder particles and a vapor grown carbon fiber having a fiber filament diameter of 10 - 300 nm, and/or (ii) the gas diffusion layer comprises a layer containing a water repellant resin and a vapor grown carbon fiber having a fiber filament diameter of 10 - 300 nm, and wherein at least part of the surface of the gas diffusion layer is in contact with the catalyst layer.

Thus, applicants have amended claim 1 to recite that the catalyst layer and/or the gas diffusion layer contains a vapor grown carbon fiber having a fiber filament diameter of 10 - 300 nm.

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In addition, in other aspects, the present invention, as set forth in independent claims 17, 21 and 22 is directed to a membrane-electrode assembly containing a gas diffusion layer that contains a hydrophobic resin and vapor grown carbon fiber having a fiber filament diameter of 10 to 300 nm. In still another aspect, as set forth in independent claim 29, the present invention is directed to a fuel cell that contains a gas diffusion layer that contains a vapor grown carbon fiber having a fiber filament diameter of 10 to 300 nm.

JP '345 discloses a gas diffusion layer comprising a carbon fiber, two fluorocarbons having different boiling points, and a carbon powder.

In contrast, in the present invention of the amended claims, the fibrous carbon in the catalyst layer and the gas diffusion layer is vapor grown carbon fiber (VGCF) having a fiber filament diameter of 10 - 300 nm.

When VGCF is used, the performance is better than when normal carbon fiber is used, which can be seen in the Examples of the present application. This can be seen by comparing Examples 2 and 7 where a PAN-base carbon fiber was employed, with the other Examples where VGCF is used. See Figs. 2 and 8 of the present application.

In view of the above, applicants submit that JP '354 does not disclose or render obvious the subject matter of claims 1, 17 and 19, or of independent claims 21, 22, 29 or the claims dependent thereon, and, accordingly, request withdrawal of this rejection.

Claims 1, 17 and 19 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 5,677,074 to Serpico et al.

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Applicants submit that Serpico et al do not disclose or suggest the presently claimed invention and, accordingly, request withdrawal of this rejection.

Serpico et al disclose a gas diffusion electrode comprising an electrically conductive porous carbon fiber sheet having a hydrophobic binder in electrical contact with a catalyst layer comprising (i) a platinum or palladium metal catalyst dispersed in the surface of a particulate carbon support, (ii) a sulfonated polystyrene and (iii) a particulate poly(tetrafluoroethylene).

In contrast, in the present invention of the amended claims, the fibrous carbon in the catalyst layer and the gas diffusion layer is vapor grown carbon fiber (VGCF) having a fiber filament diameter of 10-300 nm. Serpico et al do not disclose or suggest the use of a VGCF.

When VGCF is used, the performance is better than when normal carbon fiber is used, which can be seen in the Examples of the present application. As discussed above, this can be seen by comparing Examples 2 and 7 where a PAN-base carbon fiber was employed, with the other Examples where VGCF is used. See Figs. 2 and 8 of the present application.

In view of the above, applicants submit that Serpico et al do not disclose or render obvious the subject matter of claims 1, 17 and 19, or of independent claims 21, 22, 29 or of the claims dependent thereon, and, accordingly, request withdrawal of this rejection.

Claims 1 and 17-19 have been rejected under 35 U.S.C. § 102(b) as anticipated by EP 869568.

Applicants submit that EP '568 does not disclose or suggest the presently claimed invention and, accordingly, request withdrawal of this rejection.

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EP '568 discloses a fuel cell comprised of a membrane electrode assembly in which a catalyst layer is formed on the surface of a solid polymer electrolyte.

In EP '568, a gas diffusion layer that is used for a solid polymer electrolyte membrane electrode assembly includes a carbon fiber woven cloth having a surface and a coating of a fluororesin containing carbon black on the surface.

In contrast, in the present invention of the amended claims, the fibrous carbon in the catalyst layer and the gas diffusion layer is vapor grown carbon fiber (VGCF) having a fiber filament diameter of 10 - 300 nm. EP '568 do not disclose or suggest the use of a VGCF.

When VGCF is used, the performance is better than when normal carbon fiber is used, which can be seen in the Examples of the present application. As discussed above, this can be seen by comparing Examples 2 and 7 where a PAN-base carbon fiber was employed, with the other Examples where VGCF is used. See Figs. 2 and 8 of the present application.

In view of the above, applicants submit that EP '568 does not defeat the patentability of the present claims and, accordingly, request withdrawal of this rejection.

Claim 20 has been rejected under 35 U.S.C. § 103(a) as obvious over either JP '354, Serpico et al, or EP '568 in view of U.S. Patent No. 4,440,617 to Solomon.

Applicants submit that these documents do not render obvious the subject matter of claim 20 and, accordingly, requests withdrawal of this rejection.

The Examiner states that JP '354, Serpico et al and EP '568 do not disclose the porosity of the gas diffusion layer as set forth in claim 20. The Examiner relies on the teachings of Solomon to supply this deficiency.

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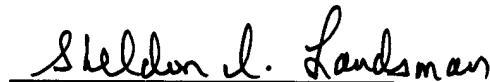
Claim 20 is a dependent claim that depends from claim 17. Accordingly, applicants submit that it is patentable over JP '354, Serpico et al and EP '568 for the same reasons as discussed above in connection with the patentability of claim 17 over these documents. Solomon does not supply the deficiencies of these documents.

In view of the above, applicants submit that claim 20 is patentable over the cited prior art and, accordingly, requests withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Sheldon I. Landsman
Registration No. 25,430

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: June 17, 2004